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# THE CRUSHED STONE JOURNAL

*Official Publication*  
The National Crushed Stone Association

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for 1930 Convention

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Conference

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JULY, 1929

# WHY HAVE LOSSES

## Poor Grading—High Overhead—Troubles

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Rock-Cut Stone Company	Jamesville, N. Y.
Rock-Cut Stone Company	Lacona, N. Y.
Rock-Cut Stone Company	Watertown, N. Y.
Mohawk Limestone Products Company	Mohawk, N. Y.
Mohawk Limestone Products Company	Jordanville, N. Y.
Mohawk Limestone Products Company	Mount Vision, N. Y.
BUFFALO Crushed Stone Company	Buffalo, N. Y.
Federal Crushed Stone Company	Cheektowaga, N. Y.
Genesee Stone Products Company	Stafford, N. Y.
LeRoy Lime and Crushed Stone Company	LeRoy, N. Y.
Ribstone Concrete Products	LeRoy, N. Y.
Dolomite Products Company	Rochester, N. Y.
General Crushed Stone Company	Oaks Corners, N. Y.
General Crushed Stone Company	North LeRoy, N. Y.
General Crushed Stone Company	Glenmills, Penna.
Wagner Quarries	Sandusky, Ohio
Wagner Quarries	Castalia, Ohio
Dolomite, Inc.	Maple Grove, Ohio
Herzog and Sons	Forest, Ohio
Ohio Blue Limestone	Marion, Ohio
National Lime & Stone Co.	Spore, Ohio
National Lime & Stone Co.	Carey, Ohio
National Lime & Stone Co.	Lewisburg, Ohio
National Lime & Stone Co.	Bluffton, Ohio
Belle Center Stone Co.	Belle Center, Ohio
Higgins Stone Company	Bellevue, Ohio
Lake Erie Limestone Company	Youngstown, Ohio
Lake Erie Limestone Company	Lowellville, Ohio
Lake Erie Limestone Company	Hillsville, Pa.
Lima Stone Company	Lima, Ohio
Spencer Stone Company	Spencerville, Ohio
Unica Limestone Company	Youngstown, Ohio
Ohio Marble Company	Piqua, Ohio
C. C. Beam	Melvin, Ohio
Rock Products Company	Toledo, Ohio
France Stone Company	Holland, Ohio
France Stone Company	Monroe, Mich.
Swint Stone Company	Fremont, Ohio
J. E. Baker Company	Bainbridge, Lancaster Co., Pa.
J. E. Baker Company	White Hall, Baltimore, Md.
New Castle Lime & Stone Company	New Castle, Pa.
New Castle Lime & Stone Company	Dunbar, Pa.
Lehigh Stone Company	Ormrod, Pa.
Stowe Trap Rock Company	Pottstown, Pa.
Carbon Limestone Company	Hillsville, Pa.

Blue Stone Quarry Company	Gwynedd Valley, Pa.
Whiterock Quarries	Pleasant Gap, Pa.
Connecticut Quarries Company	Rocky Hill, Conn.
New Haven Trap Rock Company	New Haven, Conn.
Edward Balf Company	Hartford, Conn.
John S. Lane and Son	Westfield, Mass.
West Roxbury Trap Rock Company	West Roxbury, Mass.
Old Colony Crushed Stone Company	Quincy, Mass.
Rowe Contracting Company	Malden, Mass.
Simbrico Stone Company	West Roxbury, Mass.
Casper Stolle Quarry & Construction Co.	East St. Louis, Ill.
Consumers Company	Lemon, Ill.
Federal Stone Company	LaGrange, Ill.
Michigan Limestone & Chemical Company	Rogers City, Michigan
Blesanz Stone Company	Winona, Minn.
Meshberger Bros. Stone Company	Berne, Ind.
Hy-Rock Products Company	Marengo, Ind.
Fanwood Stone Crushing & Quarry Co.	Fanwood, N. J.
Samuel Braen	Paterson, N. J.
Orange Quarry Company	West Orange, N. J.
Granite Rock Company	Logan, Calif.
Daniel Contracting Company	San Francisco, Calif.
Deitz Hill Development Company	Kansas City, Mo.
Rock Hill Quarries Company	St. Louis, Mo.
Texas Trap Rock Company	San Antonio, Texas
Dittlinger Lime Company	New Braunfels, Tex.
James Stone Company	Corsicana, Texas
Franklin Limestone Company	Nashville, Tenn.
Gager Lime Company	Sherwood, Tenn.
John H. Wilson	Honolulu, Hawaii

### CANADA

J. A. Bourbonnais	Vaudreuil, Que.
Canada Crushed Stone Corp.	Puslinch, Ont.
Coast Quarries	Vancouver, B. C.
Dufferin Construction Company	Innerkip, Ont.
Gordon Crushed Stone Company	Hagersville, Ont.
Thomas Langton Crushed Stone	Coldwater, Ont.
LaCle A. Desrochers, Ltd.	Montreal, Que.
Puslinch Quarries, Ltd.	Puslinch, Ont.
Quinn Stone and Ore Company	Ft. William, Ont.
Rigaud Granite Products Company	Rigaud, Que.
Stone and Son	Ingersoll, Ont.
Standard Lime Company, Ltd.	Joliette, Que.
Walker Bros.	Thorold, Ont.
Warden King Company, Ltd.	Montreal, Que.

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By all means bring the ladies! Cincinnati has many points of interest which should be particularly enjoyed by them, including the Art Museum which possesses a rich and rare collection of sculpture, paintings, etchings, textiles, ceramics, carvings, etc.; Rookwood Pottery, famous throughout the world for its artistic and exquisite specimens of ceramic ware; Music Hall; the University of Cincinnati, largest municipally owned university in the United States; the Cincinnati Symphony Orchestra, and many other interesting features which lack of space does not permit mentioning. Through the Convention Bureau of the Cincinnati Chamber of Commerce extensive preparations are being made to give the ladies attending the convention a unique and enjoyable time while in Cincinnati, and we are anticipating their attendance in larger numbers than ever before.

The stage is rapidly being set for the largest attended, most instructive and enjoyable convention yet held in the history of the Association, and we wish to take this opportunity of extending to everyone, whether or not members of this Association, a most cordial invitation to be present and take part in the annual business meeting of the crushed stone industry.

## Rock Dusting Proves Effective

ATTENTION is called to the Annual Report of the Department of Mines and Mining of the State of Indiana, where on pages 2 and 3 there is given the following item relative to rock dusting as applied to the coal mines of Indiana. The inspection force of Indiana is evidently convinced of the efficacy of rock dusting in preventing disastrous explosions where a blown out shot occurs.

"The rock dusting law, which was enacted by the last session of the legislature, has been working very successfully. While most of the large, dusty mines have not worked during the past fiscal year, we have approximately twenty-eight mines that are rock dusted. During the past year our experience has shown us that with rock dust we have averted what would have been a serious explosion. On two different occasions where a blown-out shot occurred, the flame spread out of the room a distance of 100 feet and came in contact with the dust on the entry, preventing a disastrous explosion."



Among those present at the Board of Directors Meeting, Ambassador Hotel, Atlantic City, July 26 and 27

## Board of Directors Authorizes Trade Practice Conference For Crushed Stone Industry

Reports of Officers and Committee Chairmen Presented at Mid-Summer Meeting in Atlantic City

**I** MOVE, Mr. Chairman, that the Board of Directors tentatively approve the Resolutions herewith presented by the Committee on Trade Practice and that the Committee be authorized to arrange with the Federal Trade Commission for a Trade Practice Conference on the Thursday immediately following our convention next January." This motion made by Mr. Graves, and duly seconded was passed with no dissenting votes and thus was chronicled in the records of the Association what we believe is destined to become one of the most far-reaching and beneficial decisions ever made by our Board of Directors. The crushed stone industry has voluntarily initiated action designed to place its House in order—a far cry from conditions which were existent not so many years ago, when in the memories of many of us it was difficult to bring competitors together in the same meeting room.

Before passing the motion recorded above, the Board gave the most careful consideration to the Report of the Committee on Trade Practice (given in full elsewhere in this issue) devoting almost an entire day to this subject. Immediately after the meeting was called to order on Friday morning, representatives of the various hotels desirous of obtaining the Convention were heard, after which the question of the Convention City was tabled until Saturday and the meeting turned over to Mr. Graves, Chairman of the Committee on Trade Practice. Mr. Graves presented his report and the question was thrown open for general discussion which was participated in by practically every member of the Board present. The Board was particularly fortunate in having at the meeting as its guests, M. M. Flannery, Director, Trade Practice Conferences Division of the Federal Trade Commission, and Dr. Hugh P. Baker, Manager, Trade Association Department, Chamber of Commerce of the United States. Both Mr. Flannery and Dr. Baker proved of invaluable assistance in straightening out many perplexing points which were raised, and the Board is deeply indebted to them for their presence at the meeting.

In accordance with this action of the Board, the Committee on Trade Practice has respectfully re-

quested the Federal Trade Commission to hold a Trade Practice Conference of the crushed stone industry at the Gibson Hotel, Cincinnati, Ohio, on January 23, 1930, which is the day immediately following our next annual convention. We have not as yet been advised as to the action of the Commission but expect to be able to announce its decision in the next issue of the "Journal."

### Reports of Officers and Committee Chairmen

Progress reports on the activities of the Association covering the first six months of the year were submitted by the officers and various committee chairmen. President Wise in his report stressed the necessity of devising means for adequately financing the Association and recommended, "that the Board appoint a committee whose duty it shall be to present a plan at the next annual meeting for changing the basis of dues from that now in effect to one based on one-tenth of a cent per ton of production. Either the one-tenth cent per ton scale must be accepted or some other plan devised for raising sufficient revenue to properly finance the activities of the Association." Regarding President Wise's recommendation it was moved, seconded and carried, "That the executive Committee be instructed to make an analytical study of our financial situation and report at the next meeting of the Board of Directors what changes, if any, should be made in our system of dues."

### Financial Situation

Comprehensive and detailed financial statements were submitted to the Board which showed that the Association had operated during the first six months well within the budget approved at the Cleveland Convention, but that the revenue necessary to operate on the basis of the approved budget had not been forthcoming to the extent expected, thus decreasing to an appreciable degree the surplus on hand at the beginning of the year.

The Board expressed itself as being vigorously opposed to any curtailment of the present activities of the Association and stated that ways and means would be devised for providing the necessary revenue to continue the work unabated during the second half year.

### Report of Secretary and Director, Bureau of Engineering

Complete reports of the Secretary and Director of the Bureau of Engineering were submitted regarding the activities of their respective departments.

The Secretary called attention to the progress which had been made towards obtaining advertising for the *Journal*, indicating the difficulties encountered and the prospects for the future which in his opinion seemed decidedly favorable. He also pointed out that the Association, on behalf of its members located in the Great Lakes territory had filed briefs before both Houses of Congress requesting that a tariff be placed on importations of crushed stone from Canada into the United States, but that the result of such action would not be definitely known until the pending tariff bill was finally framed.

Regarding the cleaning and repairing of railroad cars, his report showed that real progress had been made in this direction, the three aggregate associations having completed surveys of their respective industries relative to this situation, which has already resulted in the holding of a joint informal conference with the American Railway Association. At the conference plans for relieving the present heavy burden of expense now placed upon shippers of crushed stone, gravel and slag were discussed and a decided improvement in the situation is expected in the near future.

What should be most gratifying was his report that after paying all expenses incident to the Cleveland Convention there still remains in the convention fund a surplus of \$881.00

The report of the Director of the Bureau of Engineering covered the principle activities of that department during the first six months of the year. These included publishing articles of particular benefit to the crushed stone industry; acting for local groups of producers and for individual producers in matters pertaining to state highway specifications and other technical matters (visits were made to the highway departments of Oklahoma, Texas, Tennessee, West Virginia, the City of St. Louis and the City of Syracuse); representing the industry on technical committees; general correspondence on requests for information; presentation of technical papers before technical organizations and local groups of producers; and laboratory research.

In concluding his report Mr. Goldbeck offered the following interesting comment: "It is quite apparent

that our research work is attracting considerable attention as evidenced by the fact that we are getting numerous letters from all parts of the United States, Canada and other countries from individuals desiring copies of our bulletins and the *Journal* and requesting that their names be placed on our mailing list for future publications. About one hundred names have been added to our mailing list as a result of such letters since the first of the year.

"The work of the laboratory is progressing in a satisfactory manner and results of very considerable interest have been obtained which have provoked discussion. It is the aim to develop information which will be of the greatest practical value and our laboratory results have been found to be very useful during conferences with State Highway Departments, for it has been possible to present convincing research facts which were not available from any other source. It is believed the research work is proving to be of great benefit to the industry and it should be adequately supported by the membership."

### Membership

Notable increases in the membership of the Association were made during the first-half-year as indicated by the Report of the Membership Committee. Eighteen new active members joined the Association and thirty-two of the old members substantially increased their dues. The Associate membership also made decided gains, 13 new members having been obtained. During the same period resignations were received from seven active and five associate members.

### Committee Reports

Progress reports were submitted by the Research Committee, Accident Prevention Committee and Subcommittee for the Standardization of Commercial Sizes of Crushed Stone, which indicated that favorable progress was being made with these activities. More detailed reference to these reports has been omitted due to lack of space. Complete printed reports of these committees, however, will be available at the time of the next annual meeting.

In closing this necessarily brief account of the semi-annual meeting of the Board of Directors it would seem fitting to point out that it was the largest summer meeting held in the history of the Association. The grateful appreciation of the entire membership is due the members of the Board for the generous and

unselfish sacrifice of personal interests which many of them made in order to be present. Following is given the names of the Board members and guests who were present.

W. F. Wise	Thos. McCroskey
W. M. Andrews	Russell Rarey
H. E. Bair	John Rice
J. E. Cushing	H. E. Rodes
C. M. Doolittle	James Savage
F. O. Earnshaw	F. W. Schmidt
E. Eikel	W. L. Sporburg
E. E. Evans	R. B. Tyler
O. M. Graves	T. I. Weston
F. T. Gucker	A. L. Worthen
J. L. Heimlich	E. G. Lewis
W. E. Hilliard	C. B. Andrews
A. S. Lane	H. M. Davidson
<i>Others Present</i>	
M. M. Flannery	N. C. Rockwood
H. P. Baker	E. T. Wolf
M. B. Garber	A. T. Goldbeck
P. B. Reinhold	J. R. Boyd

## Texas Leads in Roads Built by Federal Aid

A TOTAL of 76,570.4 miles of highways have been completed with Federal assistance, according to figures compiled and made public by the Bureau of Public Roads on March 5, from the initiation of the system of Federal aid road construction in 1916 to January 31, 1929.

Of this amount the three States with the longest completed mileage as of January 31 were Texas, with 6,065.4 miles; Minnesota, 4,089.7 miles; and North Dakota, 3,693.0 miles, the Bureau stated.

On January 31 an aggregate of 8,936.1 miles was under construction at an estimated total cost of \$220,904,718.09 and with a Federal aid allotment of \$88,854,375.12. Of this mileage 7,834.5 miles were initial work and 1,101.6 miles were stage. The Bureau explained that the term stage construction "refers to additional work done on projects previously improved with Federal aid. In general, such additional work consists of the construction of a surface of higher type than was provided in the initial improvement."

The three States receiving the largest allotments of Federal aid for highways under construction as of January 31, according to the Bureau, were Illinois, \$9,-

064,161.87 for 623.5 miles at a total cost of \$20,037,484.13; New York, \$5,143,000.55 for 342.7 miles at a total cost of \$23,298,900; and Texas, \$5,106,575.21 for 640.6 miles at total cost of \$12,074,592. According to figures compiled by the Bureau the total estimated costs of highways under construction as of January 31 for those three States are also the highest.

## Lower Types Have Made More Mileage Possible

M R. WATKINS, the State Highway Engineer, in his speech on May 6 before the Lexington Automobile Club, is quoted as saying that in the nine-year period just ending, the State Highway Department will have spent \$74,000,000 in State and federal funds for the construction and betterment of roads. The money to be spent between this date and the end of the current building season (when it is estimated that we will have 5,000 miles of highways, under State maintenance) will bring this total sum to little, if any, above \$80,000,000.

That will mean that the State's 5,000 miles of roads have cost at the rate of \$16,000 per mile.

The layman doesn't know, however, that much of what is known as our high-type road in Kentucky cost three and four times \$16,000 a mile; that, on points on the great Mayo Trail and on U. S. 25, between Cincinnati and Lexington, on U. S. 60 between Louisville and Frankfort and on U. S. 68 between Louisville and Bardstown, there are many miles that cost between two and three times as much per mile as this average cost per mile of all 5,000 in Kentucky.

Hence, a large proportion of the 5,000 miles is and will be of a lower type—or of the traffic-bound, water-bound macadam, etc. Had all the roads built in these nine years been of the type demanded by an impatient public, the total number of miles completed at the end of 1929 could not have been one-half as many, and the number of people "liberated" would be less than one-third those who can now travel and move their products by motor. And these impatient and often unreasonable critics of the lower type roads always neglect to tell their auditors that the traffic-bound highway is but a "stage" of construction and is kept from the time of its first stage, well maintained, and always ready to receive the high-type top or surface, when the traffic justifies and the conditions permit it.

—From *Kentucky Highways*, June, 1929

## Report of the Trade Practice Committee

BY OTHO M. GRAVES, *Chairman*

AT THE meeting of the Board of Directors held in Cleveland, January 24, 1929, the president was instructed to appoint a Trade Practice Committee for the purpose of constructing a code of trade practice applicable to our industry, setting forth those actions illegal in themselves or conducive to unfair competition from which all of us should voluntarily agree to refrain.

President Wise promptly appointed the following committee:

Otho M. Graves, Chairman, Pennsylvania  
 Howard E. Bair, Ohio  
 H. E. Rodes, Tennessee  
 T. I. Weston, Carolinas  
 E. J. Krause, Missouri  
 O. P. Chamberlain, Illinois  
 W. L. Sporborg, New York

The first meeting of the Committee was held in Washington on March 12 with the following members present:

H. E. Bair  
 O. M. Graves  
 E. J. Krause  
 H. E. Rodes  
 W. L. Sporborg

and in addition thereto:

Dr. Hugh Baker  
 Henry P. Fowler  
 A. T. Goldbeck  
 J. R. Boyd

It early appeared in the discussion that illegal or unfair competitive methods could be most feasibly formulated by reducing them to a suitable number of adequate resolutions. The first work of the Committee at this meeting was to tabulate the unfair trade practices existing to a greater or less extent in our industry; and, secondly, to study the resolutions which have been adopted by other industries. It is significant to observe that fifty-one industries or associations have held trade practice conferences under the auspices of the Federal Trade Commission and have adopted suitable resolutions governing the conduct of their activities, and that some seven or eight others are now pending.

Certain resolutions were tentatively adopted at the first meeting of the Committee which was then adjourned to meet again at the call of the Chairman.

The second meeting of the Committee was held on April 18 and 19 in Washington in a room at the Chamber of Commerce Building, courteously offered to the Committee for its use. Those attending were as follows:

H. E. Bair  
 O. M. Graves  
 E. J. Krause  
 W. L. Sporborg

and in addition thereto:

W. F. Wise  
 A. L. Worthen  
 J. R. Boyd  
 Hugh P. Baker  
 Henry P. Fowler  
 N. C. Rockwood

During the interim between the two meetings, the members of the Committee read a considerable amount of literature on the subject and studied further resolutions which had been adopted by other associations. As a result of this broadened vision, certain changes were made in the resolutions previously adopted, and the work of the Committee completed by the addition of other appropriate rules or resolutions.

Before presenting herein the rules which have been unanimously adopted by your Committee, and which have been approved by Mr. Fowler and Dr. Baker of the United States Chamber of Commerce, certain general observations should be made.

The Federal Trade Commission Act was enacted by the Senate and House of Representatives on September 26, 1914, for the purpose of creating a Federal Trade Commission; the act defining its power and duties. Senator Cummins in supporting the bill when it was before the Congress stated: "I predict that in the days to come the Federal Trade Commission and its enforcement of the section with regard to unfair competition will be found an anchor for honest business. I believe it will introduce a stability in business that hitherto has been unknown. I believe it will restore confidence among those who are conducting their affairs honestly and uprightly. I believe it will be found to be the most efficient protection to the people of the United States that Congress has ever given the people by way of regulation of Commerce, and that it will rank in future years with the anti-trust law; and

I was about to say that it would be found still more efficient in the creation of a code of business ethics and the establishment of the proper sentiments with regard to business morals."

While all of the provisions of the Act are now in the law of the land, and are of consequent importance, the one with which we are most concerned reads in part as follows:

"SEC. 5. That unfair methods of competition in commerce are hereby declared unlawful. The commission is hereby empowered and directed to prevent persons, partnerships, or corporations, except banks, and common carriers subject to the acts to regulate commerce, from using unfair methods of competition in commerce."

In the early years of the life of the Commission it adopted the so-called stipulation rule. The Federal Trade Commission Act provides that in every case of an alleged violation of the statutes the Commission shall issue a complaint, publicly cite the respondent and hold a public hearing, all of which is not unnaturally embarrassing to the accused particularly if he is, and found to be innocent of the charge of which complaint is made. By the stipulation rule the Commission held that where it deemed it advisable to do so, it might accept the stipulation of the individual accused that he would cease and desist from the unlawful practice thus permitting him to avoid, if he so desires, the embarrassment and cost of the procedure just described. The authority of the Commission to accept such a stipulation lay in its belief that the greater power include the lesser and with a recognition that in this manner a reconciliation between the law and business practice might be effected more simply, expeditiously and less offensively.

To quote from a recent address before the Chamber of Commerce by the Hon. Abram F. Myers, former member of the Trade Commission: "The Trade Practice Conference procedure is a logical outgrowth of the stipulation rule. If the Commission may stipulate with an individual, why not with an industry? The Commission under the statute acts in the public interest in all things; and the public interest cannot be more effectively furthered than by the wholesale exclusion of unlawful and uneconomic practices."

Colonel Nelson B. Gaskill, also a former member of the Federal Trade Commission, has expressed the opinion that—"The trade association is the greatest agency for the development of self-government in business which has yet been devised, and the trade conference is the most important and essential element in the de-

velopment of industrial self-government which has yet made its appearance upon the industrial stage. There is no question whatever in my mind that in the development of the trade conference agreement—a trade practice conference itself—lies the solution of problems which cannot be reached by legislation, and in which the effort to reach a legislative or governmental solution means only the destruction of the self-government principle \* \* \*. As the matter now stands, the trade practice conference has no legal status. There is nothing in the law which authorizes the Federal Trade Commission to call a conference \* \* \*. The fact that it is held under the direction and the guidance of the Federal Trade Commission serves to remove that element of suspicion, of uncertainty, of doubt, which otherwise might lead to a criminal indictment if the trade agreement so reached were found to be in violation of the anti-trust laws."

For an industry to voluntarily inform the Federal Trade Commission that it has agreed to refrain from certain illegal or competitive unfair trade practices is not, as has been occasionally erroneously urged by the uninformed, bringing government into business. On the contrary it is emphatically developing the principle of business self-government, and in order that such agreements as are reached may be free from the element of suspicion to which Col. Gaskill refers they are adopted by and with the advice and consent of the Federal Trade Commission.

It may be reasonably held as expressed by Mr. Myers that—"It was the purpose of the act that the Commission, taking into account the custom and institutions of business, might gradually build up a body of law which would in effect give definition to the broad language of the statute."

At present, however, the Commission clearly holds that it is not a legislative body; it does not seek or attempt to render unlawful that which is clearly legal merely because of a trade practice agreement; nor does it attempt to enforce any rules adopted by the industry which are not in themselves contrary to the Federal statute. The Commission does recognize, however, that an industry may willingly agree to rid itself of certain uneconomic and unfair practices which do not specifically offend the law and to such rules and resolutions it gives its tacit consent and approval, and its moral persuasive force without in the least attempting to enforce them at law. It is obvious, therefor, that such rules as may be adopted by an industry for its own self-government must be divided into two groups; the first of which includes those practices which are

unlawful, placing in the second group those which are unfair, uneconomic, wasteful and undesirable, yet which have not been held by the courts to be unlawful.

Your Committee has, therefor, classified the rules it has adopted into these two groups, and while the Federal Trade Commission may interchange rules from one group to another it is believed that the classification herein made will probably be acceptable as offered. Should the Board of Directors approve the rules as presented by your Committee, or accept them with such modification as may be deemed proper, the next step in the procedure would be to petition the Federal Trade Commission to call a Trade Practice Conference of the entire industry. Your Committee has already requested the Secretary of the Commission to tentatively set aside for this purpose the Thursday immediately following the next annual convention pending such action as the Board may take at this meeting. If held, the entire day, free from any other convention activities whatever, would be devoted to the Trade Practice Conference, and one of the Commissioners would preside.

Assuming that the industry should adopt the resolutions they would then be submitted to the Commission for its further study and subsequent acceptance or modification. If accepted the Commission would request all those engaged in our occupation to sign the rules after which they would become effective.

It would be desirable and certainly feasible for the Association through a special committee appointed for that purpose, or through the Executive Committee, to hear complaints of alleged violation. Should complaint of an alleged violation be made to such a committee the respondent would be so informed, though the name of the complainant would be withheld, and he would then have the opportunity of submitting to the committee such extenuating circumstances as might exist, or entering a denial of the charges. If in the judgment of the committee the alleged violation actually existed and without extenuating circumstances it could request the offender to cease and desist from the practice, and if such assurance was not promptly forthcoming, the committee could lay the complaint and evidence concerning it before the Federal Trade Commission for action. In such an event the entire Association would be the complainant thus relieving any individual producer from the embarrassment of bringing an action against a competitor. It will be observed that in such procedure far from the government encroaching upon business, the industry is given the op-

portunity of regulating itself, only appealing to the Federal Trade Commission when its own efforts prove futile.

Your Committee recognizes the inadequacy of this report, and would feel impelled to discuss the subject more thoroughly were it not for the fact that supplementary verbal reports will be offered by the members of the Committee with illuminating and explanatory comments by Mr. Fowler and Dr. Baker of the United States Chamber of Commerce and Mr. Flannery, Secretary of the Federal Trade Commission.

The rules adopted by the Committee and proposed to the Board of Directors for acceptance are stated below with a brief comment on each rule immediately thereunder.

## Resolutions Probably Classed in Group I

### Inducing Breach of Contract

*Rule 1.* The willful interference by any person, firm, corporation or association, by any means or device whatsoever, with any existing contract or order between a seller and a purchaser, in or about the production, manufacture, transportation, purchase or sale of any product handled by the industry, or the performance of any contractual duty or service connected therewith, such interference being for the purpose or with the effect of dissipating, destroying or appropriating, in whole or in part, the patronage, property or business of another engaged in such industry, is an unfair trade practice.

(NOTE)—Influencing or inducing a person to break his contract with another is of course a legal wrong for which the person injured may recover damages. If the act of persuading another to break his contract is done for the purpose of injuring the competitor's business, or if it has that effect, the act is not merely a legal wrong but it is also an unfair method of competition and within the jurisdiction of the Federal Trade Commission.

In the ordinary case, the rule as quoted has application to attempts by a manufacturer for example, to persuade customers of his competitor by offering reduced prices or otherwise to break orders already definitely placed and accepted.

### Misbranding

*Rule 2.* The marking or branding of products of the industry for the purpose or with the effect of misleading or deceiving purchasers with respect to the quantity, quality, size, grade or substance of the materials purchased, is an unfair trade practice.

(NOTE)—The branding of products in such a way as to deceive or mislead customers, whether this is done purposely or is merely the effect of the branding, is deemed to be an unfair method of competition.

### Fraud and Misrepresentation

*Rule 3.* The sale or offering for sale of any product of the industry with intent to deceive customers or prospective customers as to the quantity, quality, size, grade or substance of such product, is an unfair trade practice.

(NOTE)—Any form of misrepresentation, not including misbranding, which is designed to deceive customers is prohibited by this rule. In its present form, it appears that the rule does not extend to cases where the misrepresentation was unintentional. In this respect, the rule is to be distinguished from the preceding rule on misbranding.

### Secret Rebates

*Rule 4.* The secret prepayment of transportation charges and or the payment or allowance of secret rebates, refunds, credits, or unearned discounts, whether in the form of money or otherwise, or the giving of premiums, or extending to certain purchasers special service or privileges not extending to all purchasers under like terms and conditions, is an unfair trade practice.

(NOTE)—As a general proposition, it may be considered the policy of the law to place all competitors as nearly as possible on an equal footing. Any practice which has for its purpose the secret preferential treatment of a purchaser clearly destroys the proper equality between competitors.

### Price Discrimination

*Rule 5.* Any discrimination in price between the purchasers of the same class, not including discrimination in price on account of the difference in grade, quality or quantity of the product sold, or which makes only due allowance for difference in cost of selling and transportation, or discrimination in price in the same or different communities not made in good faith to meet competition, where the effect of such discrimination may be to substantially lessen competition or tend to create a monopoly, is an unfair trade practice.

(NOTE)—The present language is a restatement of Section 2 of the Clayton Act. The principle involved is similar to that mentioned in connection with Rule 4—namely, it is in the public interest that, so far as possible, competitors should be placed upon an equal footing.

*Rule 6.* As freight and trucking charges are necessarily reflected in price, and as the variable practice on the part of sellers of requiring purchasers in some instances to pay such charges and in other instances of assuming such charges causes unfair price discrimination, the failure of the seller to require the purchaser

in each instance to pay published charges for freight and trucking is an unfair trade practice.

(NOTE)—Price discrimination may take the form of allowing transportation charges in whole or in part to some customers and not to others. The present rule goes to the extent of saying that where the seller proposes a schedule of charges covering freight and trucking, his failure to adhere to such schedule in every instance operates to discriminate against certain purchasers and in favor of others and is illegal.

### Defamation of Competitor or Disparagement of His Materials

*Rule 7.* The defamation of a competitor by words or acts imputing to him dishonorable conduct, inability to perform contracts, or questionable credit standing, or the false disparagement of the grade or quality of his materials, is an unfair trade practice.

(NOTE)—It is generally recognized that fair competition does not permit the circularization of false reports relating to a competitor's products or defamatory statements concerning the competitor himself. This is so recognized by the Federal Trade Commission.

### Sales Below Cost

*Rule 8.* The selling of goods below cost for the purpose of injuring a competitor and or with the effect of lessening competition is an unfair trade practice.

(NOTE)—By a modification of an earlier rule, the Commission has sanctioned the statement that selling goods below cost, not to meet competition or to move surplus stocks but for the purpose of injuring a competitor or of eliminating competition is an unfair method of competition.

Conversely it is neither illegal nor an unfair trade practice to sell goods below cost for the purpose of moving surplus stock or to meet competition.

### Commercial Bribery

*Rule 9.* The paying, or promising to pay, to an employee of a customer or prospective customer, of a commission or consideration of any character for the purpose of inducing or compensating for a sale, is an unfair trade practice.

(NOTE)—Influencing the judgment of an employee of a customer by the payment of some form of bribe in order to secure business has long been condemned at common law as an interference in the mutual relations between the customer and his employee. This is also unfair as regards competitors under the Federal Trade Commission's interpretation of "unfair competition" as used in the Federal Trade Commission Act.

*Rule 10.* The offering or giving of commissions, prizes, premiums, gifts or excessive entertainment, as

an act of commercial bribery, to any one in connection with the sale, purchase or use of any product distributed by manufacturers within the industry, or as an inducement thereto, is an unfair trade practice.

(NOTE)—The offense condemned by this rule is the use of special inducements, in no way related to the quality of the product but amounting to preferential treatment to certain customers, to induce sales. Some question may arise as to what is meant by "excessive entertainment." In general, it may be suggested that whether entertainment or gifts are considered "excessive" must necessarily depend upon the facts in each case as they arise. In the application of the rule it is clear that the intent with which the gift is made is in large measure controlling, especially where there is an attempt to interfere with a relationship such as that mentioned in connection with the previous rule.

## Resolutions Probably Classed in Group II

### Inducing Sales by Other Products

**Rule 11.** The practice of offering a product at a price lower than the competitive market price for that product in the particular locality as an inducement for the purchase of one or more other products constitutes discrimination and tends toward the creation of monopoly and the lessening of competition and is an unfair trade practice.

(NOTE)—Although the practice condemned by this rule is usually viewed as unfair by the various industries which have come in contact with it, the objection is probably economic rather than legal. The rule raises a question involved in competition between industries rather than within a single industry. Nevertheless, under the proper showing that the practice would actually have the result of creating a monopoly or lessening competition, it would seem to come within the jurisdiction of the Federal Trade Commission.

**Rule 12.** The sale of certain products without profit for the purpose, directly or indirectly or with the effect of furthering the sale of some other product constitutes discrimination when it tends toward the creation of monopoly and the lessening of competition and is an unfair trade practice.

(NOTE)—In this form the rule would seem to follow the principle involved in rule against selling below cost (Rule 8, above) and may possibly be placed by the Commission in Group I. In principle, it would seem unimportant whether the sale condemned by these rules was below the competitive market price or was without profit. In either case, if the act tended toward the creation of monopoly or the lessening of competition, it would seem to be in violation of the federal anti-trust laws.

### Anti-Dumping

**Rule 13.** The practice of certain manufacturers and sellers of shipping quantities of their product into territories outside their particular territories, and of selling such material below the general market prevailing in such other territories into which shipments are made, seriously tends to demoralize the market within the territories into which shipments are made, disrupts normal competitive conditions throughout the entire industry, and is condemned an unfair trade practice.

(NOTE)—Following the gypsum industry conference, a rule of this character was eliminated by the Commission with the statement that the practice condemned came within the rule against price discrimination (similar to Rule 5, above). The dumping of goods in other markets is without doubt a discrimination against customers in the home district, as well as being prejudicial to the interests of competitors in those districts into which the goods are shipped. Even although the practice here condemned is illegal as a violation of Section 2 of the Clayton Act, it may be distinctly helpful to retain a rule on this subject, appropriately worded, in order to call to the attention of members of the industry the illegality of the practice.

### Enticement of Employees

**Rule 14.** The enticement of employees from a competitor for the purpose of interfering with his business is an unfair trade practice.

(NOTE)—This rule does not apply to the hiring of a single employee from a competitor, nor does it warrant anything in the nature of an agreement among competitors not to employ persons now working for each other. The rule points out that any attempt to injure a competitor's business by hiring away his employees is not a lawful method of competition. As in the case of many of the other rules the intent with which the act is done is highly significant.

### Terms of Sale

**Rule 15.** The industry hereby records its approval of the practice of establishing definite terms of sale, and the reasonable adherence thereto, and the continued violation by a manufacturer of his terms, for the purpose and with the effect of price discrimination, shall be deemed an unfair trade practice.

(NOTE)—Although it is clear that no one can be compelled to publish the terms under which his products are sold, nevertheless it is the contention of the industry as expressed in this rule that one who publishes terms of sale should see that they are observed. Further, where the terms are enforced as regards some customers and not as to others and this lack of uniformity in practice results in price discrimination under Section 2 of the Clayton Act, the industry condemns the action as an unfair method of competition.

## Some Observations on Accelerated Soundness Tests

BY A. T. GOLDBECK,  
*Director, Bureau of Engineering, National Crushed Stone Association*

IT is a matter of common observation that all construction materials undergo change when they are subjected to the elements. Some of them weather at an extremely rapid rate, others so slowly that a long period of years is required to bring about a noticeable alteration, but the ultimate action of severe weather exposure is inevitable. This phenomenon of weathering due to the physical and chemical effects of exposure is of vital interest to those concerned with the use of structural materials.

Some structures typified by monumental buildings are constructed with the idea that they will stand for centuries; others are known to have a comparatively short life due to a number of causes other than their resistance to the weather. Thus, large office buildings become obsolescent within a comparatively few years. Their life is controlled by economic considerations. Highways have an even shorter period. They are subjected to extremely severe weather conditions but their resistance to traffic may be the predominating factor which controls their life.

Before a structure is built, full thought should be given to the ability of its component parts to withstand the particular conditions of exposure to which it will be subjected. Very frequently its weather resistance is a far more important consideration than its ability to carry the required loads, however important this may be. Not many years ago the importance of weather resistance was not as fully recognized as it is today and many unsuitable materials have been placed in use which have greatly lessened the life of expensive structures.

The ability of different types of rocks to withstand the weather is imperfectly understood by the engineer and in view of the importance of this subject it is thought well to publish the results of recent preliminary investigations made in the laboratory of the National Crushed Stone Association. It would be highly desirable if it might be reasonably well predicted whether a proposed construction material will be sufficiently resistant to the weather conditions to which it will be subjected. It is not always feasible to compare a proposed material with a similar material whose resistance is known although the petrog-

rapher has made important steps forward in this respect and by making a petrographic analysis he is now able to detect certain unstable minerals which disintegrate rapidly when exposed to the weather. Obviously, the engineer cannot wait for a long period of years to expose his proposed construction materials to weathering to see how they will behave and for this reason several different types of laboratory tests have been devised whose purpose is to simulate the action of the elements with greatly increased destructive effect.

It is commonly observed that the greatest enemy to the life of rock structures is frost action and although there are other destructive effects to which structures are at times submitted, their ability to resist frost is by far the most important and the accelerated tests which have been devised are aimed to imitate the disintegrating action of ice. The present paper deals with this particular form of accelerated soundness test.

Ice occupies a volume approximately 11 per cent greater than the volume of water and consequently when water freezes within the pores of the rock an expanding force is exerted which produces internal stress. If this stress exceeds the strength of the rock, failure takes place and the result is a gradual scaling off of the surface or at times a splitting action which tends to break it into smaller pieces.

### The Sodium Sulphate Soundness Test

When different kinds of salts crystallize from solution in the pores of rock they also exert an expanding action not unlike that produced by the growth of ice crystals and consequently an accelerated test has been devised making use of the expansive force of sodium sulphate crystals. The so-called sodium sulphate accelerated soundness test as described in Bulletin 1216 of the U. S. Department of Agriculture entitled, "Tentative Standard Methods of Sampling and Testing Highway Materials" reads as follows:

#### METHOD OF TEST FOR SOUNDNESS OF COARSE AGGREGATE

1. Immerse 10 small pieces (total weight about 1,000 grams) of the rock in a saturated solution at 70°F. of sodium sulphate ( $\text{Na}_2\text{SO}_4$ ) for 20 hours, after which place them for

4 hours in a drying oven maintained at 100°C. Repeat the treatment—times. The operation of immersing, heating, re-immersing, etc., shall be continuous. Note the condition of the rock as to soundness at the end of the test.

2. Samples which exhibit marked disintegration shall be considered to have failed in this test.\*

Apparently, the interpretation of the above description by various testing laboratories has not been uniform and as a consequence variable results have been obtained on samples of the same variety of rock. Depending upon the method of conducting the tests either different forms or different amounts of sodium sulphate crystals may result and it is to be expected that because of these variable formations different expansive effects will likewise be produced.

Sodium sulphate crystallizes into three common forms,  $\text{Na}_2\text{SO}_4$ ,  $\text{Na}_2\text{SO}_4 \cdot 7\text{H}_2\text{O}$  and  $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$  and probably there are still other forms which may depend upon a number of variables in the method of conducting the test.

Among these possible variables are:

- Temperature of solution when saturated.
- Temperature of solution in conducting the test.
- Temperature of the air.
- Humidity of the air.
- Temperature of the oven when the specimen is first placed in it for drying and perhaps other more or less important variables which tend to increase the amount of crystallization or change the form of crystallization.

To study some of the possible variables in the method, a number of different variations of the sodium sulphate test were employed on a sample of rock which previous investigations showed to be unsound when exposed to this test. The rock in question is a marble containing layers of interlocking calcite crystals. The variations used in the 8 different test methods are most simply shown in Table I.

It will be seen that the variables include the temperature at which the solution was saturated, the temperature of the solution at the time of immersion, the presence or absence of sodium sulphate crystals in the solution, temperature of the solution during the time

\* A correct interpretation of the results of the sodium-sulphate soundness test will be greatly assisted by a visual examination of the ledge from which the sample was obtained. Failure in the test, when accompanied by evidence of weathering of the exposed surface, may be considered sufficient ground for rejection.

TABLE I

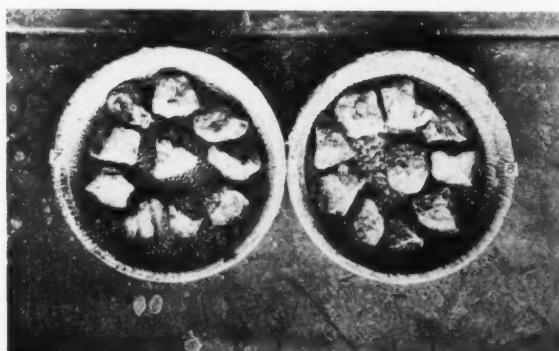
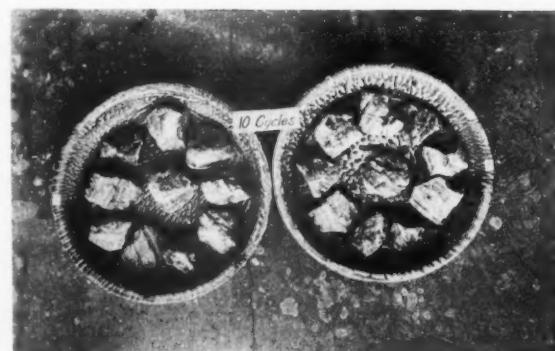
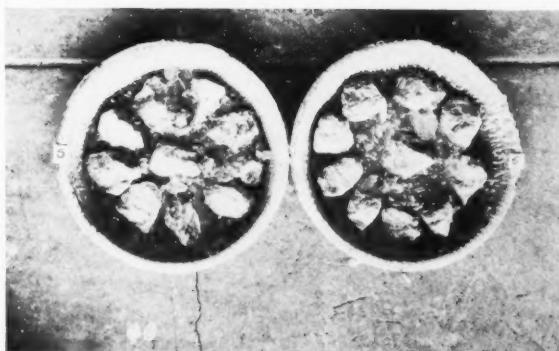
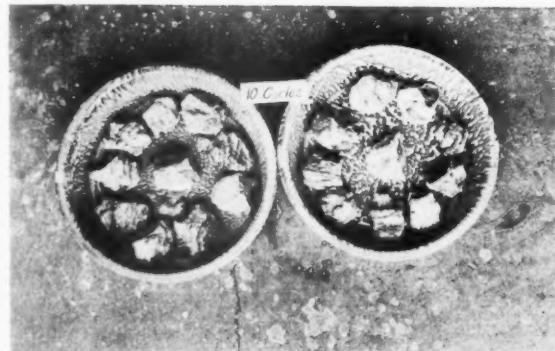
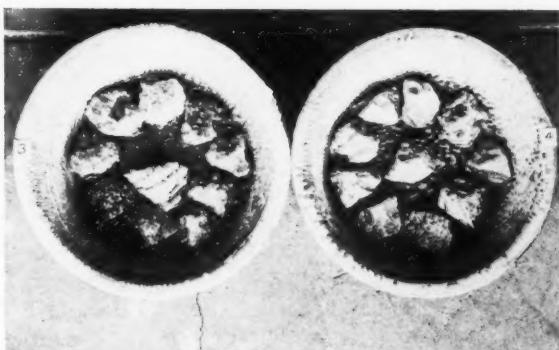
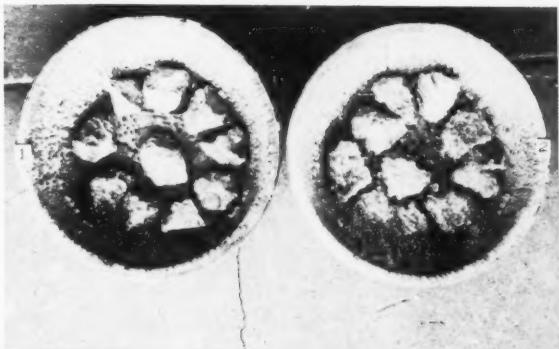
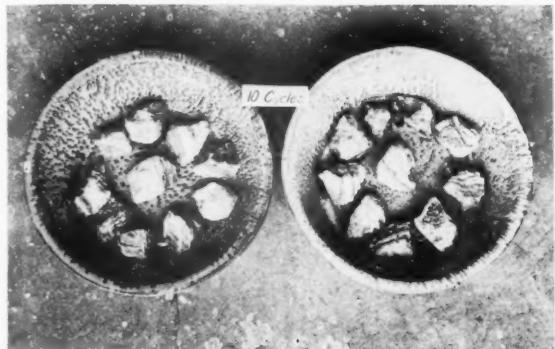
Test No.	Temperature of Solution at Immersion Degrees Fahrenheit	Presence of Crystals in Solution before Immersion of Sample	Pans Covered or Uncovered	Temperature Condition of Rock when Immersed
1	90° Sol. Sat. at 90°	No excess crystals	uncovered	hot
2	70° " " 70°	No excess crystals	" temp. 60°	hot
3	70° " " 70°	No excess crystals	uncovered	cool
4	70° " " 70°	No excess crystals	<sup>1</sup> " temp. 80°	hot
5	70° " " 70°	Excess crystals	covered	hot
6	70° " " 70°	Excess crystals	uncovered	hot
7	70° " " 70°	No excess crystals	covered	hot
8	70° " " 70°	No excess crystals	uncovered	hot

<sup>1</sup> Pan placed in moist atmosphere.

of immersion, control of the extent of evaporation by covering or uncovering the pans containing the solution and the temperature of the rock when immersed in the solution. The effect of these different methods of test on the sample of marble is shown in Table II.

Ten pieces of rock were used in each test listed in the above table and the tabulation shows the number of pieces which remained unaffected and the number which failed completely. Those pieces which showed incipient failure are not indicated. A study of the table will reveal that the different test methods exerted different effects and that one method might reject the sample whereas another method might accept it. Thus, at the end of 5 cycles, the number most generally used for highway aggregates, a wide difference in the effects of the various forms of tests is evidenced by the wide range in number of sound pieces remaining at the end of this number of cycles.

Photographs of the specimens after ten cycles of the sodium sulphate test conducted in the foregoing 8 different ways are shown in Figures 2A to 2D inclusive and a close study will show the bad state of disintegration of the rock when tested by method 3. A study of the photographs, Figures 1A to 1D show-



FIGS. 1A TO 1D

Illustrating variable crystallization of sodium sulphate due to variations in method of conducting sodium sulphate test.

FIGS. 2A TO 2D

Variable effects of sodium sulphate test conducted on same sample of rock using different test methods, producing crystallization shown in Figs. 1A to 1D.

ing the different forms of crystallization resulting from the above 8 different test methods is interesting in demonstrating that the extent of growth and size of individual crystals, and likewise their shape, vary considerably.

TABLE II  
RESULTS OF SODIUM SULPHATE TEST CONDUCTED  
IN EIGHT DIFFERENT WAYS

Number of Alternations	TEST NUMBERS							
	TEST NUMBERS							
	1	2	3	4	5	6	7	8
1	10—0	10—0	10—0	10—0	10—0	10—0	10—0	10—0
2	10—0	10—0	10—0	8—0	10—0	10—0	10—0	10—0
3	10—0	8—0	7—0	8—0	9—0	9—0	9—0	10—0
4	10—0	7—0	6—0	8—0	9—0	5—0	9—0	10—0
5	8—0	3—0	3—0	4—0	4—0	2—0	7—0	5—0
6	8—0	0—0	0—0	2—0	0—0	0—0	1—0	1—0
7	8—0	0—0	0—0	2—0	0—0	0—0	1—0	1—0
8	6—0	0—0	0—0	4—2	0—0	0—0	0—0	0—0
9	4—0	0—0	0—0	5—1	0—0	0—0	0—0	0—0
10	4—0	0—0	0—0	5—1	0—0	0—0	0—0	0—0
11	3—0	0—0	1—0	5—1	0—0	0—0	0—0	0—0
12	3—0	0—1	0—0	5—1	1—0	0—0	0—0	0—0
13	3—1	0—3	3—0	6—1	2—0	3—0	4—0	0—0
14	3—2	0—4	0—8	1—4	0—4	0—4	0—0	0—0
15	3—2	0—4	0—8	0—4	0—5	0—5	0—0	0—0
16	3—3	0—5	0—8	0—4	0—5	0—5	0—0	0—0
17	2—3	0—5	0—8	0—4	0—6	0—5	0—0	0—2
18	1—3	0—5	0—8	0—4	0—6	0—5	0—0	0—2
19	1—7	0—10	0—8	0—7	0—7	0—7	0—5	0—7
20	1—7	0—10	0—8	0—8	0—8	0—7	0—6	0—8

OK: unaffected by test

F: failure

Note: 10 pieces used in each test. Pieces showing incipient failure are not noted in this table.

It would not be safe to draw conclusions from the results of so few tests conducted on a single sample of rock but one thing is surely outstanding, namely, that the different methods of conducting the test do result in a difference in crystallization and they do result in different degrees of disintegration. It must be quite apparent that unless all testing laboratories conduct the test in a given way, different results will be obtained and the results will not be truly indicative of the value of the rock for structural purposes even granting that the sodium sulphate test can be accepted as indicative of probable service behavior and as will be shown later there is some doubt as to this.

Evidently those factors which are known to control crystallization should be very carefully watched in conducting the sodium sulphate test.

1. The strength of the saturated solution should be uniform; and the solution should be saturated

when the temperature is as close to 70° F. as practically possible.

2. The temperature of the solution during the time of immersion should be kept constantly at 70°, for if the temperature is allowed to fall below this in variable amounts there will be variable amounts of crystallization.
3. Evaporation of the solution should be prevented. The higher the evaporation, the more concentrated will become the solution and the more extensive will be the crystallization.
4. The temperature of the rock at the time of immersion of the specimen should be controlled, preferably by cooling it down to room temperature and finally,
5. The oven should be preheated to the required temperature before placing the specimens in it for drying.

In brief, the present description of the method of making the sodium sulphate test is far from adequate and is in need of revision so that each operation will be described in rather complete detail. Merely as a suggestion of a more detailed test procedure which probably does not completely eliminate all of the difficulties of this test the following description is given.

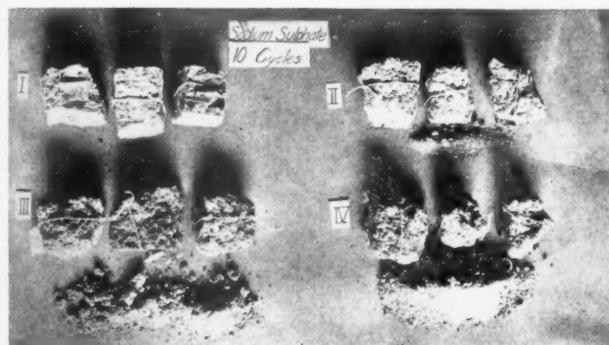
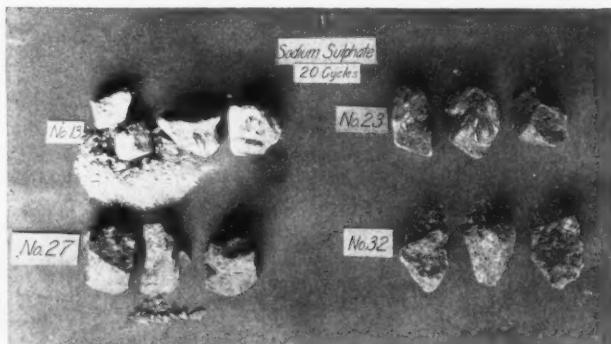
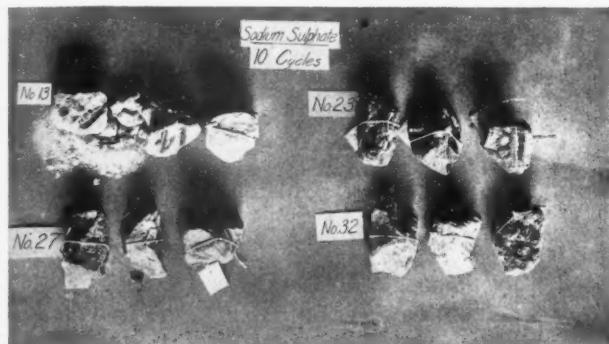
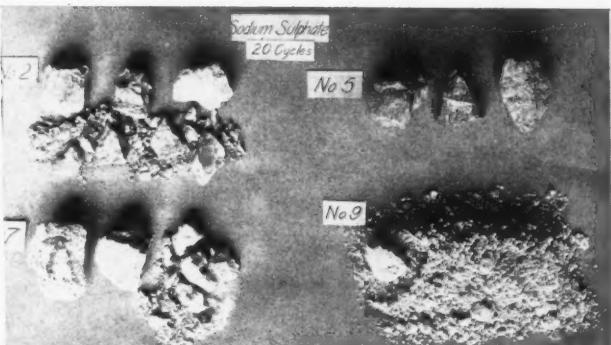
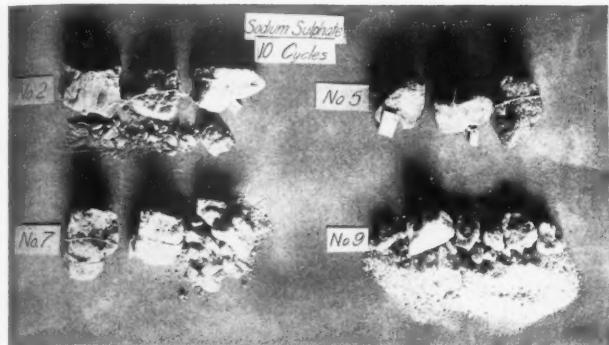
#### Suggested Test Procedure, Sodium Sulphate Test

Select not less than 8 pieces of the material, each piece weighing approximately 100 grams. Dry the sample at 100° to 105°C. for 4 hours. After cooling weigh and identify each piece by number, recording the weights of the individual pieces as well as the total.

Immerse the dry, weighed sample in a solution of sodium sulphate saturated at 70°F. (21.1°C.) contained in an agateware or other suitable container. The container shall be covered to prevent evaporation and the solution shall be maintained at a temperature of 70° to 75°F. while the sample is immersed in it. No free crystals shall be present initially.

Keep the sample immersed for a period of 18 or 19 hours after which remove it and *immediately place it in a shallow pan*.

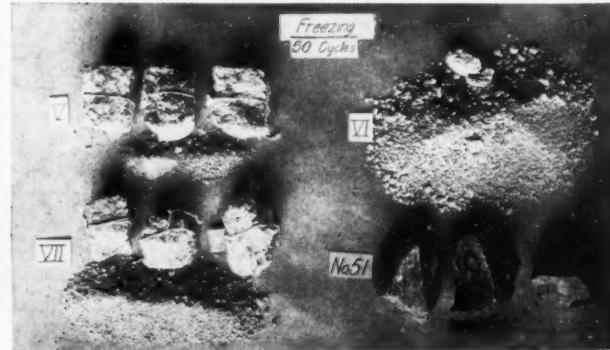
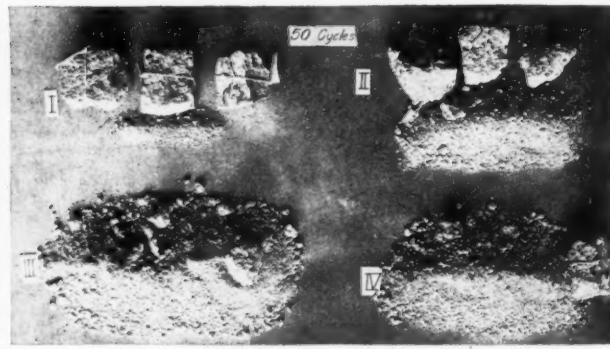
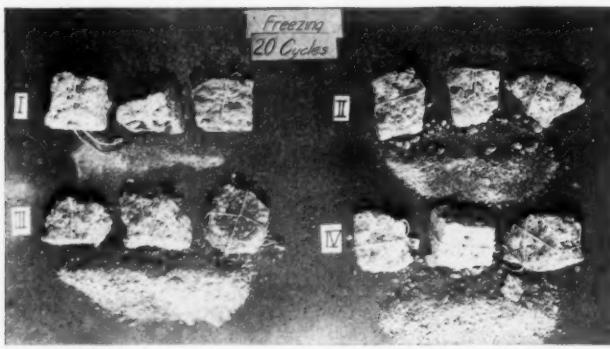
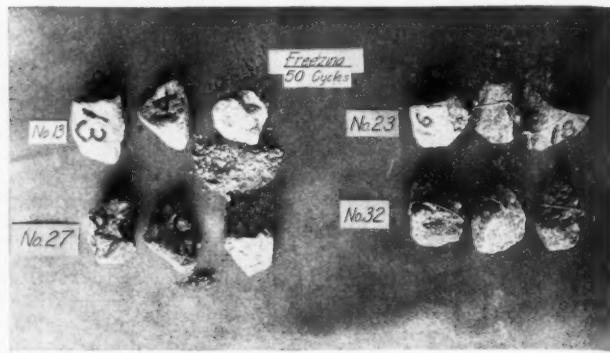
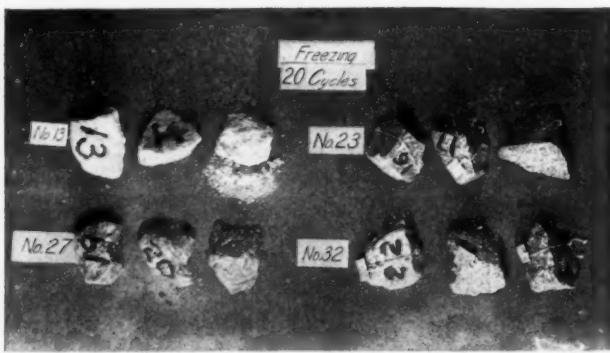
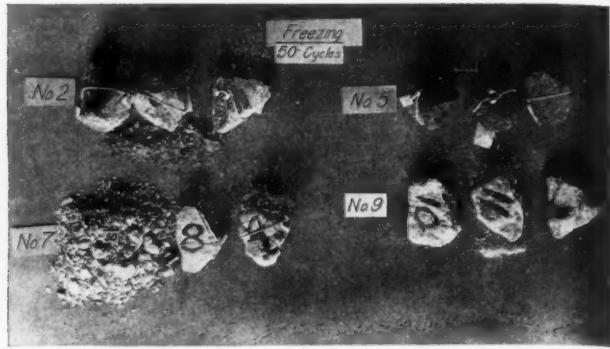
*Immediately place the pan in an oven which has been preheated to a temperature of 100° to 105°C.; maintain the oven at that temperature for 4 hours after which period the sample shall be removed and allowed to cool over a period of 1 to 2 hours to air temperature.*



FIGS. 5A TO 5D—10 CYCLES

FIGS. 5E TO 5H—20 CYCLES

*Effect of sodium sulphate test on same materials shown in Figs. 4A to 4H*



FIGS. 4A TO 4D—20 CYCLES

FIGS. 4E TO 4H—50 CYCLES

**Effect of freezing and thawing test on different samples of rock and Portland cement mortar**

Examine each piece for fracture and incipient cracks and record its condition.

At the end of the cooling period re-immers the sample in the sodium sulphate solution.

One immersion and one period of drying and cooling constitutes a cycle.

Repeat the above treatment through the required number of cycles, or until obvious failure where the identity of the individual piece is lost.

At the end of the required number of cycles wash the material thoroughly, boiling if necessary, to remove all contained sodium sulphate and save all fines. Dry and weigh each piece as circumstances will permit, record the weight of all material over 1 inch in size and calculate the loss of material  $\frac{1}{4}$  inch in size.

**Failure:** Pieces of material which exhibit disintegration, marked checking or cracking or are split into three or more separate pieces, or are so cracked that it is evident that they will do so shall be considered as having failed in the test. It is suggested that the sample be considered to have failed when it has lost a selected percentage of the original weight of the sample at the end of 5, 10 or more alternations. Obviously, the severity of the exposure will warrant a different set of limits for per cent of loss in different localities and these limits will have to be determined by comparison with the behavior of the material in service. For highway work 5 alternations of the sodium sulphate test is generally sufficiently severe.

(Note: If for any reason the continuity of the testing must be interrupted, as for example over weekends, the sample should remain in the solution.)

### Freezing Tests

Recognizing the unsatisfactory status of the sodium sulphate test as now conducted and further realizing the possibility of utilizing the accelerated freezing test as a means for determining the weather resisting properties of rock, efforts have been directed in the laboratory of the National Crushed Stone Association to the development of a rapid form of freezing test. The freezing apparatus (Figure 3) consists of a six-compartment freezing cabinet connected with a one-half horse power compressor. Each compartment is 20 inches deep and 10 inches in diameter. With this apparatus temperatures as low as  $14^{\circ}$  below Zero F. are possible. The method of conducting the freezing test is as follows:

Specimens of stone approximately  $1\frac{1}{2}$  inches in diameter are prepared with the use of a hammer and

these pieces are immersed to half their depth in a pan of water. When a number of tests are made on different samples the pans containing the specimens are stacked one on top of the other and are placed in a galvanized iron container which fits in the compartment of the freezing apparatus. To effect

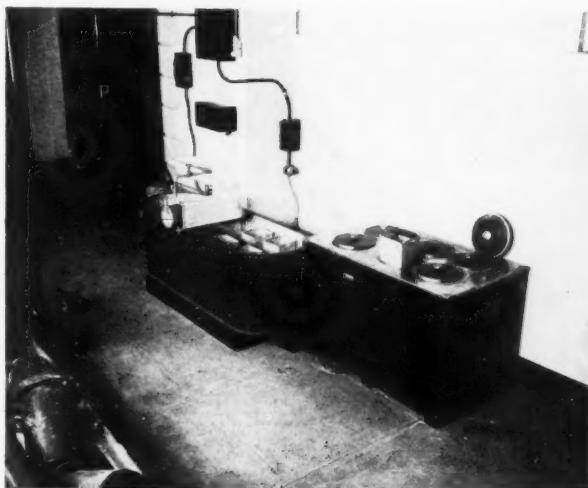


FIG. 3—FREEZING APPARATUS

rapid freezing, the space between the galvanized can and the sides of the compartment is filled with alcohol. The test is conducted by freezing the specimens for a period of 16 hours. They are then thawed during the day over a period of 8 hours and the process is repeated. Each piece of stone is given an individual number and record is made of the conditions of the sample at frequent intervals. In figures 4A to 4D are shown the results of 20 freezing tests on a number of samples of rock and Portland cement mortars. Figures 4E to 4H show the condition of these samples after 50 alternations. Some of these are sound and some show signs of unsoundness. It is, of course, impossible to state definitely how many alternations of freezing in this form of test are equivalent to a given number of alternations in service. Unquestionably this test is very severe, for freezing takes place at the surface of the rock very shortly after it is placed in the freezing apparatus, and the rapidity of the freezing very likely has some effect on the severity of the test. In an effort to determine the relation between the freezing and thawing test and the sodium sulphate test, if such a relation exists, comparative tests were made on specimens from identical samples of rock and these results are tabulated in table

No. III and the effects of the sodium sulphate tests after 10 and 20 alternations are shown in Figures 5A to 5D and 5E to 5H.

### Comparison of Sodium Sulphate and Freezing Tests

A comparison has been made after 50 alternations of freezing and thawing and 20 alternations in the sodium sulphate test and the results are expressed in terms of percentage of loss of the various materials. There is no very good relation observable between the two tests. In 9 cases freezing and thawing had caused more disintegration than the sodium sulphate test and there are 4 cases in which the sodium sulphate test has caused more loss than freezing and thawing.

TABLE III—RELATION OF FREEZING AND THAWING TEST AND SODIUM SULPHATE TEST

Sample No.	Per cent Loss	
	Freezing 50 cycles	Sodium Sulphate 20 cycles
2	6	38
5	0	0
7	30	25
9	0	85
13	7	18
23	0	0
27	0	0
32	0	0
35	31	5
17	0	0
24	13	4
31	0	0
I	9	0
II	34	0
III	100	44
IV	71	40
V	6	0
VI	100	19
VII	27	2
51	0	2

Note: Samples I to VII are Portland cement mortars and the remaining samples are stone and gravel.

On samples Nos. 9 and 51 the freezing test had no appreciable effect whereas the sodium sulphate test had considerable effect on sample No. 9 and little effect on No. 51. Sample No. 9 which showed very bad disintegration in the sodium sulphate test and no disintegration whatever in the freezing and thawing test is a marble and is a typical illustration of the fact that the sodium sulphate test may give entirely erroneous results in indicating a rock to be unsound when actually it is entirely sound and quite able to resist severe freezing.

A similar case has been noted in which a rather coarse grained granite failed badly in less than 10 al-

ternations of the sodium sulphate test and yet has withstood 65 alternations of the freezing and thawing test with no signs of failure whatever.

The freezing and thawing test just described gives promise of being an exceedingly convenient laboratory test for the soundness of rock and other aggregates and it can be performed almost as rapidly as the sodium sulphate test, provided the period of alternation is reduced. It is quite possible to obtain at least 2 alternations per day, and perhaps more.

### Freezing Tests on Mortars

When failure occurs in concrete under the action of the weather the question arises as to whether the defect is attributable to the coarse aggregate or to the mortar portion of the concrete. In order to obtain some idea of the relative resistance of mortars of varying degrees of richness and varying water ratios, freezing tests were conducted on mortars as well as on coarse aggregates. For the purpose of direct comparison with the mortar, a stone was selected which has been thought by some engineers to be the cause of defective concrete roads. This stone is a siliceous limestone and somewhat resembles other cherty limestones which are known to be troublesome. As has been pointed out by Dr. Herbert F. Kriege, (See Rock Products, April 27, 1929, page 50, The Stability of Chert.) cherts vary widely in their stability. Some of them are decidedly unsound and others show no signs of unsoundness. The mortar specimens for the present investigation were prepared by breaking pieces from the broken ends of mortar test beams. These beams were prepared from Portland cement passing the standard specifications and from Potomac River sand having the following mechanical analysis.

#### MECHANICAL ANALYSIS OF SAND

Passing Sieve No.	Retained Sieve No.	Per cent
4	4	1
8	8	8
16	16	10
30	30	20
50	50	36
100	100	19
Passing	200	2.4
	200	2.5
Total		99.9
Fineness Modulus	=2.37	

The quantities used in the mortar mixtures were as follows:

TABLE IV  
QUANTITIES OF MATERIALS USED IN MORTAR TESTS

No.	Mix by Wt.	Cement lbs.	Sand lbs.	Water lbs.	Flow (1/2" drop)	W/C	Com-bined Water, lbs. (estimated)	Free Water lbs. (estimated)
I	1:1	55.0	55.0	19.4	163	0.53	6.9	12.5
II	1:2	36.6	73.2	21.6	165	0.89	5.1	16.5
III	1:3	27.5	82.5	22.5	176	1.22	4.8	17.4
IV	1:4	22.0	88.0	22.9	164	1.57	4.2	17.7
V	1:2	36.6	73.2	19.2	169	0.79	5.1	14.1
VI	1:2	36.6	73.2	29.0	300+	1.19	5.1	23.9
VII	1:2	36.6	73.2	23.3	205	0.96	5.1	17.2

The specimens were cured in the moist room at 70° for a period of 27 days. They were broken as simple beams on 20-inch span with the following resulting values for modulus of rupture.

MODULUS OF RUPTURE OF MORTARS USED IN FREEZING TESTS

No.	Modulus of Rupture (lbs. per sq. in.)	No.	Modulus of Rupture (lbs. per sq. in.)
I	1044	IV	338
II	656	V	780
III	491	VI	546
	VII		660

In table IV are shown the quantities of cement, sand and water in the mixture and also the quantity of so-called free water is indicated. This was estimated by assuming that the same percentages of free water existed as determined by F. H. MacMillan and indicated by him in a recent report. (See Report of the Director of Research, November, 1928, Portland Cement Association.) It seems to be indicated at least that the extent of the disintegration has some relation with the amount of free water present and bears a better relation with this quantity than with the water-cement ratio.

A coarse aggregate would have to be of very poor quality to be as little resistant as these particular mortars and stone No. 51 hitherto under suspicion is very much more resistant than mortar—far richer than it is customary to use in concrete highway construction. The condition of these samples after 20 and 50 alternations of freezing and thawing is shown in Figures 4C, 4D, 5C and 5D respectively, samples I to VII inclusive.

Sodium sulphate tests were also made on samples of mortars broken from the same mortar beams from which the mortar freezing specimens were taken. The results of these tests after 10 and 20 cycles respectively are shown in Figures 5C and 5D and 5G and 5H. It is quite noticeable in the photographs that the effect on these mortar samples of 20 cycles of freezing is

more severe than 20 cycles of the sodium sulphate test and this comparison shows how very severe this form of freezing test is. It may also give a clew as to how many cycles of this test or of the sodium sulphate test are required to be comparable with service conditions. Shales which are unsound have disintegrated after the second alternation of the freezing test. There is uncertainty as to how many cycles of either the freezing test or the sodium sulphate test an aggregate should withstand without failure, but the indications are that 10 cycles of freezing are sufficient to indicate unsoundness of a rock or lack of resistance of mortar to moderate freezing conditions. In general, 5 alternations of the sodium sulphate test are sufficiently severe except for abnormal cases of exposure, and as pointed out the results may reject a suitable material.

The preceding points are mentioned without any attempt at the present time to draw any conclusions but rather to indicate the trend of our investigations on accelerated soundness tests.

Indications from Test Results

The following indications drawn from these tests which perhaps may be reversed after fuller investigation seem to be warranted at the present time.

1. That the sodium sulphate test as at present practiced cannot be relied upon to give identical results unless identical methods are used in conducting the tests. This explains why different laboratories may obtain different results.
2. The present description of the sodium sulphate test is not definite enough and should be written in greater detail.
3. The sodium sulphate test may reject material which has been shown to be entirely sound not only in practice but as proven by a severe form of freezing and thawing test.
4. The action of the sodium sulphate test on Portland cement mortars does not seem to be as severe as the action of the freezing and thawing test.
5. There is no distinct relation between the results of freezing and thawing tests and the sodium sulphate test. In some cases one is more severe than the other.
6. It is indicated that the freezing and thawing test promises to be a very convenient accelerated soundness test which has the advantage of subjecting the sample to freezing conditions obtaining in service but in a more severe form. It, therefore, accomplishes the desired results in a direct way rather

(Continued on page 23)

## The Crushed Stone Journal

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J. R. BOYD, Editor

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## Central Mixing Plants

**A** MOST informative article entitled "Commercial Central Mixing Plants for the Manufacture and Sale of Ready-mixed Concrete," was presented by Norman Beggs, Structural and Technical Bureau, Portland Cement Association before the last annual convention of the National Sand and Gravel Association of which a limited number of re-prints are now available. Mr. Beggs' comments on this very important subject should be of decided interest and value to many crushed stone producers. Copies may be obtained by writing direct to the National Crushed Stone Association, Merchandise Building, 1735 14th St., N. W., Washington, D. C.

## Concrete Pavement Tests May Save Road Money

**A** CONCRETE test pavement about one-half mile long, made up of slabs 9 feet square and 7 inches thick, is being constructed at the Arlington Experiment Station of the United States Department of Agriculture by the Bureau of Public Roads. When tests are made, engineers of the Bureau hope they will show that the prevailing mixtures used in making concrete for roads may be modified by the use of a larger proportion of coarse aggregate such as gravel, slag or crushed stone, so as to effect a substantial saving in cost and at the same time increase the strength and durability of the concrete.

The prevailing mixture for concrete pavements is one part cement to two parts of sand and three and one-half parts of crushed stone or gravel. Engineers believe that, if it is possible to secure as good or better concrete when the proportion of broken stone or gravel is increased to four and one-half parts, a saving of about \$1,000 per mile in the cost of concrete roads will be effected.

The test road is being built just as an ordinary concrete road would be constructed except that the mixture for each slab will contain a different kind or amount of coarse aggregate and a different quantity of water. Mixing, placing and finishing of the concrete will be done in accordance with modern paving practice, using standard equipment.

After curing, the slabs will be drilled for cores and subdivided into beams suitable for flexure or bending tests.

Supplementary tests will also be made on beams and cylinders cast at the time the pavement slab is placed, which will show the relationship between the strength of molded specimens and that of specimens cut from pavement slabs.

## A Trade Practice Conference Question Box

**E**LSEWHERE in this issue is made the announcement that the Federal Trade Commission has been requested by the National Crushed Stone Association to call a Trade Practice Conference for the entire crushed stone industry to be held at the Gibson Hotel, Cincinnati, Ohio, on Thursday, January 23, 1930, the day immediately following the next annual meeting of the Association which will also be held at the Gibson Hotel. The National Association, representing the or-

ganized commercial crushed stone producers has taken the initial step in voluntarily asking the Commission to call a conference for the industry, but let it be distinctly understood that the conference is not exclusively for the members of the Association but includes all crushed stone producers. Further that such action as may be taken by the conference next January will be binding on the entire industry.

It would seem unnecessary to repeat here the purpose of the conference or to discuss the tentative trade practice resolutions which have been adopted, as the Report of the Trade Practice Committee printed in full in this issue covers the situation in detail.

We do, however, wish to commend to every crushed stone producer in the United States a most careful and thoughtful reading of the resolutions which have been proposed. It is entirely possible that the intent and probable interpretation of some of the resolutions is not fully clear. We will be more than glad to answer any questions which may occur and in order that all may receive the benefits of such questions and answers it is proposed to carry in the *Journal* a page devoted to this purpose. In publishing the questions in the *Journal* in no case will the name of the correspondent be given and if preferred questions can be sent in anonymously. In such a manner it is hoped that many perplexing points can be cleared up well in advance of the date of the conference. Send your questions in immediately addressed to J. R. Boyd, Editor, The Crushed Stone Journal, 1735 14th St., N. W., Washington, D. C.

## 7,000 Miles of Federal-Aid Highways Improved Last Year

DURING the fiscal year 1929, the Federal Government cooperated with the States in the improvement of 7,022 miles of Federal-aid highways, bringing the total mileage of the system improved with Federal aid to 78,096, according to figures of the Bureau of Public Roads of the United States Department of Agriculture. The year's mileage was improved in the 48 States and Hawaii by the State highway departments working in cooperation with the Federal bureau. There are approximately 188,000 miles of main interstate and intercounty highways in the Federal-aid system, of which the above mileage and approximately an equal mileage built by the States without Federal assistance is now improved.

The 7,022 miles improved include 1,056 miles of graded and drained earth roads, 563 miles of sand-clay, 1,293 miles of gravel roads, 189 miles of water-bound

macadam, 728 miles of bituminous macadam and bituminous concrete pavements, 3,101 miles of Portland cement concrete pavement, and 48 miles paved with vitrified brick. Forty-four miles of bridges and approaches were also constructed.

In addition to the improved mileage, at the end of the year there were under construction with Federal aid 9,526 miles, 8,358 of which were undergoing initial improvement, and 1,168 were being given a higher type of surface than was provided in original construction. The estimated cost of the mileage under construction is \$238,158,495, which includes Federal funds in the sum of \$96,500,347.

At the end of the year there were also approved for initial construction, 1,833 miles of highways and a further 1,065 miles to receive a higher type of surface. The total cost of the approved mileage is estimated at \$61,500,674 to which Federal funds in the sum of \$24,137,546 have been allotted.

## Some Observations on Accelerated Soundness Tests

(Continued from page 21)

than in the indirect and apparently uncertain manner of the sodium sulphate test.

7. In the present tests the Portland cement mortars were quite rapidly attacked through the action of freezing and thawing and possibly they are the cause of certain forms of disintegration of concrete. Some of the mortars disintegrated to an even greater extent than the worst of the coarse aggregates. This line of investigations should be pursued further to determine the effects of excess water and impurities in the sand, such as clay, excess silt, etc.
8. It is indicated that the amount of disintegration due to freezing and thawing of Portland cement mortars is dependent not on the richness of the mortar but rather on the amount of free water present or on pore space which exists after evaporation of the free water.

As before stated the above indications are not to be considered as final and an extended investigation may lead to a reversal in some instances or at least a modification of the above statements. It has been thought worth while, however, to publish the results of the present investigations merely as a progress report for they may be helpful in corroborating similar investigations made elsewhere, or in pointing the way for others who may be contemplating making investigations of a similar nature.

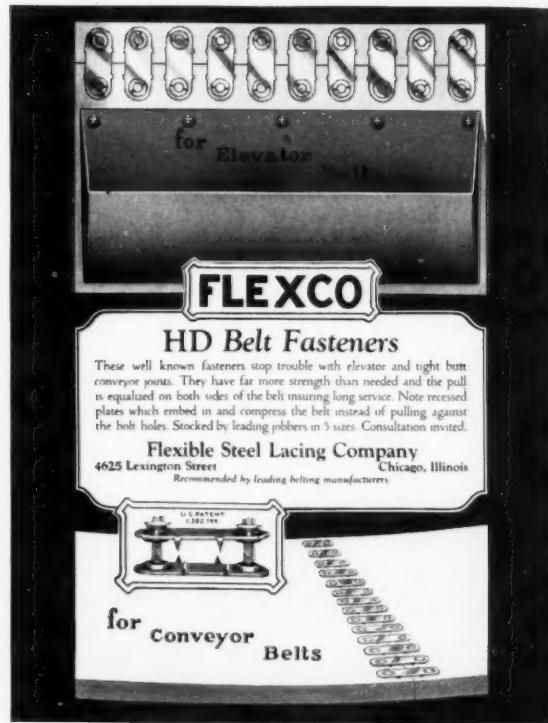
## Trade Journals Combine

WE HAVE just recently been informed that the Complete Service Publishing Company, publisher of *Pit and Quarry*, and the *Pit and Quarry Handbook*, has purchased *Cement, Mill and Quarry*, and the *Directory of Cement, Gypsum, Lime, Sand, Gravel, and Crushed Stone Plants*, both of which have heretofore been issued by National Trade Journals, Inc., of New York.

*Pit and Quarry* will continue to appear every other Wednesday but under the new combination title, "Pit and Quarry with which is consolidated Cement Mill and Quarry." The consolidation will become effective with the publication of the September 11 issue of *Pit and Quarry*.

"Pit and Quarry Handbook" will be known as "Pitt and Quarry Handbook with which is consolidated the *Directory of Cement, Gypsum, Lime, Sand, Gravel and Crushed-Stone Plants*." Publication annually will be continued.

We wish to extend to *Pit and Quarry* our sincere congratulations and we wish them the best of success in their new undertaking.

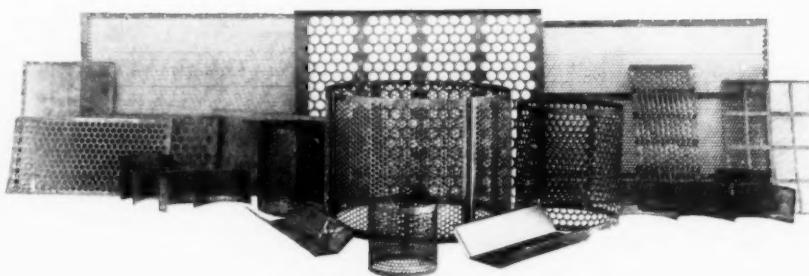


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